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MECHANICAL SCIENCE IN RURAL SCHOOLS

Class TT169

Book .M4

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NOTICE

This book is not for sale but for gratuitous distribution to a limited number of superintendents.

The discussion contained in this book will be extended and reprinted in a book entitled RURAL EDUCATION in which the author will give definite plans for the incorporation of Mechanical Science as an essential factor of education.

The book is based upon the thesis that this is an industrial age and that, therefore, the spirit of this age rather than mere industrial forms or processes should be the central element of all school work. Definite plans are elaborated for teaching all the usual subjects in harmony with this ideal. A considerable portion of the material offered is the result of many years of careful experimentation on the part of the author.

Rural Education, (In preparation) **Cloth**, 150 pages. $1.00 Send in your order at once.

Mechanical Science in the rural school increases the interest and decreases the work of discipline to such an extent as to make the work of the teacher lighter and more satisfactory to both pupils and patrons.

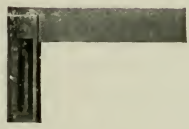
A North Dakota Rural School

Mechanical Science

in

Rural Schools

A contribution to better rural schools



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PREFACE

This book telling of the Mechanical Science work in rural schools is a part of a larger work entitled RURAL EDUCATION. The larger work contains a more complete discussion of the Mechanical Science work together with a discussion of the entire rural education problem, but does not contain the definite suggestions in regard to equipment and supplies required for teaching the Mechanical Science work that are given in this book.

In the preparation of this book actual examples of teaching Mechanical Science in rural scools have been taken as typical of what may be accomplished in all rural schools by employing competent teachers and providing the necessary tho small amount of epuipment.

That the work has been both beneficial and satisfactory cannot be questioned. That it must eventually form a part of the work of all rural schools seems certain.

How to go about establishing the subject is the real problem. The author hopes that this book will be of substantial aid in this work.

When problems arise that seem to require assistance, write to the publishers telling them exactly what the difficulty is and they will do all in their power to aid you.

The one question usually asked is, "How can the one teacher in a rural school attend to this work in addition to all of her present duties." This has been answered beyond any reasonal le doubt. The introduction of Mechanical Science is such an aid to discipline and so raises the general tone of the school as to decrease the work of the teacher rather than add to it. This is the invariable result in such schools as have established the work and will, no doubt, be the result in substantially all schools.

It has also been shown that the work so increases the interest in the school work as a whole as to raise the standings in all subjects. There is positively no reason why this subject ought not to be taught in every school including every one room rural school.

Rural Education

The book, RURAL EDUCATION will be published as soon as possible. In it much more complete information in regard to the theory of the work is given. By forwarding your order at once for this book you will be certain to receive your copy as soon as published.

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Three facts that have been demonstrated beyond dispute.

1. The Mechanical Science work keeps more pupils in the shop and keeps them longer in school than does any other system of instruction.

2. The degree of proficiency attained by the pupil at the completion of any grade or course is far beyond that resulting from the use of any other system of shop instruction.

3. Those who enter industry have a better and broader foundation far accomplishing satisfactory work and a much greater probability of success than is given by the use of any other system of school shop instruction.

A STORY OF A RURAL SCHOOL

Our story begins at a "Corn Show". It was a more than ordinary show held in a city known to many educators. The county superintendent, wishing to make it as helpful as possible requested of the Normal School an exhibit and was accomodated by a rather complete exhibit of the shopwork. The exhibit included not only selections of work done at the school, but also a bench at which pupils from the school worked at certain periods of the day doing the regular work of their class.

Attracted Attention

It will be readily believed that such an exhibit would attract considerable attention. Business men of the city, farmers from the country, and mechanics of all lines were greatly interested and would stay by the booth to watch some operation thru.

In order to make clear the scientific nature of the work, and to emphasize the difference between

this system and the usual manual training work the pupils were employed at simple problems, such as squaring a small piece, sawing to line and planing end, making measurements, finishing surfaces, etc.

Mechanics See the Work

On several occasions the booth was visited by those who were especially able to judge of the difficulties of the work. Several times the visitors declared that such work was impossible for boys and not until they had returned at a time when the boys were at work and actually saw the grade of work accomplished would they admit it possible.

Farmer and Wife Become Interested

Among others especially interested in the exhibit were a farmer and his wife. They enquired in detail about the work, watched the boys, and closely examined the finished projects. It became evident that more than a passing interest had been aroused, for the lady sought an opportunity to enquire if she might be admitted to the Normal School. Such a request seemed so completely the result of wanting to know fully about the work that it was granted and the lacy was admitted to the Normal School. On her part there was no lack of interest for quite regularly she came the twelve miles over the prairie to her work which had been arranged for one half day a week.

At the Corn Show

Perhaps we should make clear that no requirements regarding standards for admission were violated in admitting this farmer's wife to the Normal School for she had already graduated from college. Lest someone should think that her farm life had caused a loss of interest and faith in college work it should be known that at this time this lady of the country had two daughters attending the State University.

Lady Attends School

As occasion offered during the weekly lessons questions were asked in regard to work for rural schools and at last definitely in regard to the one room school near the lady's home. Two questions had been answered by demonstration. First, that the work would be of certain benefit to the pupils from the first, that even tho they might leave school so early in the course as to get but a few lessons, yet those few would be of real value and furnish both an incentive to continue in the rural school, or on completion of the rural school course to desire to continue school in order to gain a larger knowledge of the mechanical work.

Study Instead of Noise

The other feature which really determined the possibility of having the work in the rural school was the matter of quietness which is so much a

special feature of this system of work. Genuine thinking is not a noisy process, and when shop-work is made a science and the thot element magnified the noise lessens to an almost unnoticable amount. It was, therefore, evident that the work would be beneficial and, also that it could go on thruout the day without disturbing other recitations. That this lady was fully capable of passing judgments on these features of the work and the practicability of having the work in the one room school will not be questioned when it is known that these opinions were based upon twenty years of experience in teaching.

Securing a Teacher

The next question was that of teacher. The district could not afford to pay a salary sufficient to secure a thoroly qualified teacher of shopwork. The best that could be done was to secure a teacher of known reliability in other subjects who had shown a liking for the new work, but had not a sufficient knowledge of it to command a salary and position in a larger school. This resulted in securing Miss C whose record as a teacher of other school subjects was good and who would have, by the opening of the school, such a course in Mechanical Science as was given during a six weeks summer term in classes giving special attention to the rural school work.

No doubt a better preparation would have been an advantage, but the lady had reasoned it out in some what this manner. We cannot secure a teacher of better qualifications, this teacher can teach the work so it will be of real value to our pupils, therefore we will employ her and do the best we can. With these conclusions well thot out in consultation with the patrons of the school the parents association took up the prblem and soon formed a satisfactory plan for securing a competent teacher. A small amount of extra salary was secured and Miss C was employed to teach the school. The whole planning and carrying out of the project was largely the work of the people of the community.

Securing Equipment

The parents association soon raised funds with which to purchase equipment. Not many tools were required, because they were used all day long. Such tools as were purchased, were of the best grades for mechanics use, the very makes and sizes that the pupils would purchase for their own use should they enter a woodworking trade.

The Bench

The bench, shown in the following picture, was a simple but very substantial one, because a rigid bench is an absolute necessity for best work.

This ***rural*** *school won first prize over a* ***city*** *school*

Miss **C** *Teaching Mechanical Science in a Rural School*

It was a rigidly built in home made bench, cheaper and far more servicable than the usual portable ones offered by dealers. Tools and materials were kept beneath the bench or on the wall, but little space being required because they were to make small projects only in the first years. This should not be understood as stating that the projects were small and would lead to dilettante work for, from the first, every piece was large enuf in all three dimensions to demand correct tool usage and permit of thoroly practical tests by the pupils themselves.

No Pupils Held Back

As the work was new to all the pupils, all began at the same lesson but were soon far apart and working on different projects as well as on different problems. In this subject no pupil is held back because of some slower one. This is a great aid in keeping the older boys in school. It also encourages each pupil to do his best, often with the added value of a greatly increased effort in other school subjects.

Learn to Use Textbooks

Each pupil was provided with a shop text which he could study at his seat or at home. The texts were so complete that no additional directions were required of the teacher and from

the first the pupils were taught to study the texts until they were certain that they understood fully what was stated. This habit of careful study, which could be enforced in this subject as in no other, soon showed in the study of other subjects and gave proof of its worth in the annual tests.

The use of a textbook from which to get information for immediate use has a very different result from the usual study of textbooks to get information for which the pupil sees no use. The valuable results gained by the use of such complete shop texts have not been equaled by the use of any other method.

Book Friends

Pupils have found in these textbooks their first book friends. They have learned how to go to books for needed information, both how to find it and how to study so as to understand and use it.

This acquaintance and use of books soon extends to other subjects with the result that better work is accomplished.

The use of these textbooks has, in some cases, led to an interest in books and the beginning of a personal library by boys who had previously been book haters, refusing to learn to read or use any books whatever. These textbooks have been used with remarkable success for several years in a reform school.

Objectors Become Supporters

At first some of the parents objected to the teacher and pupils spending time on such work, but they soon saw the effects of the work by the manner in which their children did the home tasks and became enthusiastic friends of such shopwork.

The most serious difficulty met with was that of judgments based upon experiences with the usual manual training work. Some of the patrons did not understand at first that the subject to be taught was Mechanical Science rather than the manual training with which they were acquainted. Because similar tools are used for some parts of the work it required a little time to demonstrate the difference. When these patrons realized the difference and great superiority of the Mechanical Science work they became its firm supporters.

Miss C Reelected

Owing to the lateness of beginning work the first year, because equipment was not ordered before the opening of school, no large display of work could be made at the end of the year, but what the pupils had learned that had been discovered by their parents was sufficient to result in the reelection of Miss C for another year and the continuance of the work and use of the same system.

Second Year

The second year was very much as the first, except that one boy who ought to have taken the work the first year, but could not be urged to do so, decided to take up the work. He not only was convinced that it was best for him to enter the class, but had thot over the pros and cons until he had such confidence in the value of the study that he worked with so great earnestness as to complete nearly two year's problems in the one year. It has never been necessary to make the Mechanical Science work compulsory in order to have practically all boys enter the classes.

A Positive Demonstration

At the close of the second year the county superintendent requested that an exhibit of the work be made at the county fair, This exhibit came into competetion with an exhibit of a city having the usual well equipped shops of the city schools in charge of a teacher of experience and highly recommended by two of the best known institutions fitting persons for teaching the usual manual training work. The work exhibited by the city school was fully up to the standard of manual training work as taught by well qualified manual training teachers thruout the country. This gives to this contest exceptional value in determining which system of shop instruction is best.

Rural School Wins

It will no doubt seem impossible for the little rural school with only one room and one teacher to win first prize over a city school thus equipped and having a special shop teacher, yet this is exactly what occurred. Not only did the rural school win first prize but it also won the opinion of those who saw the exhibits. They considered the work superior in every respect. It was easily seen that more work was accomplished, grade for grade, and executed in a much more workmanlike manner. Could they have analyzed the work fully they would have found that the rural school pupils had learned much more; that the Mechanical Science work had given greater ability to do home tasks; and that they had used more direct and very superior methods of work.

A Valuable Subject

Thus two years of Mechanical Science in a rural school was consummated. Pupils, teacher and parents had found a school subject that not only interested the pupils, both boys and girls, but gave values which parents could recognize. It not only taught things worth while in practical lines but also formed habits that raised the grade for the school as a whole. One boy told his teacher that he thot the reason she did not have to tell him as formerly to keep quiet was that in his

shop period he worked off all that restlessness, and wanted to study while at his seat.

Teacher's Work Easier

The teacher stated that she considered her work easier because of the Mechanical Science, for now there was so little trouble from disorder that she had more time for regular work than before.

Only a Rural School

And this was only a little country school away out on the prairie. It had no advantages over other country schools except one; it had some disadvantages, yet the work was started, prospered, and pleased both parents and pupils. The one advantage which it was so fortunate as to possess was an earnest man and woman who were willing to go to great trouble and some expense to find out what was desirable in the line of school shopwork and then patiently and earnestly work for the establishing of the right system of work.

A Thoro Investigation

Probably no other system of school shopwork has been as thoroly investigated before adoption by any school. Who ever before heard of a patron of many years' experience in teaching driving twelve miles week after week to study a subject simply to

know for certain whether it was the best subject and methods of teaching to have taught in their own rural school. This thoro study and investigation of the work and its subsequent adoption and success leaves no doubt about its being the system for rural schools.

Others May Do as Well

But other communities have their Mr. and Mrs. and, if not, the same results may be obtained by the initiative of the county or district superintendent or by some enterprising member of the school board.

This beautiful piano bench was made with the simple equipment used in rural schools. In workmanship and finish it was fully up to that of high grade commercial work.

OTHER SCHOOLS

From this one school the work has spread to other parts of the state. Everywhere the work has been a success. It has been taught under a variety of conditions and in schools from the very small one-room schools to those of the larger cities. The one feature of teaching things worthwhile of immediate use has ever been prominent and always resulted in an increased interest in school work by both pupils and parents.

The following illustration is of a school out in a western county that has had the work for several years. One young man teaches the school including the Mechanical Science and also the preparation of hot lunches and incidentally other things about cooking and household science.

This school uses a small portable bench as it seems most suitable for their needs. Other schools have used a small folding bench that occupies but a few inches of space by the wall when not in use. In the book, RURAL EDUCATION, a picture of this bench in use is shown. It was used in one of the smaller rural schools. For various schools benches have been designed to fulfil special requirements. The publishers will gladly furnish information of

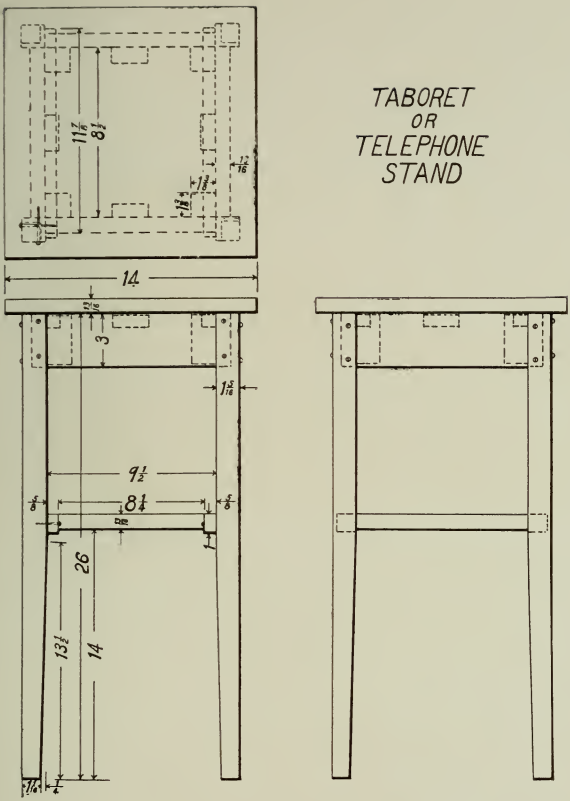
what others have done that will assist schools in making plans for instalation of equipment.

In some consolidated schools a separate room is used for the Mechanical Science work. In others, altho a separate room has been provided, it has

A Young Man Teaches This School

been found much more satisfactory to have the bench in one of the regular study rooms.

The Mechanical Science work is so completely in harmony with modern life that benches and tools in the school room seem perfectly in accord with the purposes and ideals of the place. Nowhere has the use of the school room for Mechanical Science work caused any disorder or injury to the other subjects. It has given a tone of practical value to the school that has made all the work more beneficial and has lessened the work of the teacher.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14

WHAT YOU SHOULD EXPECT OF MECHANICAL SCIENCE

Every parent and every tax payer has a right to ask what will be the returns if the Mechanical Science work is taught in his local school. There need be no hesitancy in giving a full and clearly stated answer to this enquiry. The work has been taught for a considerable length of time and in a great variety of schools and in small schools under a variety of conditions. These experiences leave no doubt about what would be accomplished in a one-room rural school by a teacher having fair preparation. The amount of preparation the teacher should have is discussed under the subject "Securing Teachers".

Improved Habits

The first fundamental of the Mechanical Science work that must be emphasized in this connection is that the entire course is planned to create ability and initiative on the part of the pupil rather than to make things for use in home or school. This does not mean that no useful articles are made but that the emphasis is placed on teaching

the boy and girl how to do work so that they can go home and do the work that is needed to be done rather than to emphasize the making of things for use which invariably leads to make shifts in workmanship and little, if any, real learning of useful methods of work.

Important Values

With these facts clearly in mind it is easily understood that the important values to be gained from the study of Mechanical Science will be improved methods that will be useful in all kinds of work, tool processes that can be applied to a great variety of tasks, a knowledge of tools that will make possible the selecting and keeping in order of tools, and thoroly practical knowledge of such materials as are used in the making and repairing of things about the home.

Careful Methods

We may, therefore, place as the first and most valuable result of the Mechanical Science work the training in thotful, careful methods of work that lead, not only to ability to do many tasks, but also avoids spoiling materials or injuring tools. A mother told a teacher that she believed that the great improvement in her daughter's attitude in home work and the care and thoroness with which she did all her home work was no doubt the result

of the lessons in Mechanical Science in the rural school. The publishers have many similar reports leaving no doubt but that the methodical and accurate work required by the problems of the school are certain to establish these desirable habits that will appear in the home occupations. The increase in speed is a natural consequence of working thotfully and carefully and is certain to result from a proper continuation in the study of this subject.

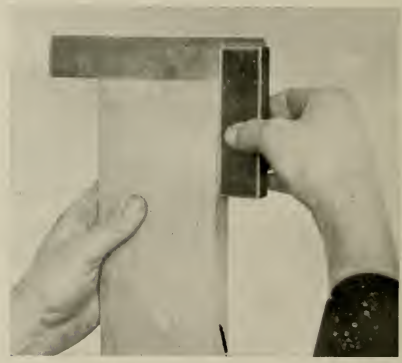
He learns to draw lines accurately with both knife and pencil.

The boy who has had a course in Mechanical Science knows what he can do and what he cannot do and will gladly undertake work within his ability and complete it in a thoroly workman-like manner and will also be very careful not to undertake a tasks he cannot complete. He will make his plans intelligently and carry them to completion with reasonable speed. The parent need have no fear of his boy spoiling either tools or materials for in school he is taught to care for his tools and keep them in first class condition and to work all materials so as to produce the article called for by his

problem at the least practicable cost. He is taught to sharpen his tools and do all his work with such tools as would he used in the farm shop.

Keep Tools Sharp

One of the most frequently asked questions is "Can the girl teacher teach boys to keep their tools in order, can she file saws"? To this the publishers can reply that they will guarantee that every young lady who completes the regular course can fit planes, chisels, and saws as well as the average mechanic and can teach her pupils how to do as well. It is possible in most cases, if not in all, to quickly recognize whether Mechanical Science or only manual training is taught in a school by simply examining the condition of the tools. So thoroly are the pupils taught to use only tools that are in good condition that there is no trouble about having the tools properly cared for except in the first lessons.



He learns to true ends accurately.

Tool Processes

Some of the more important tool processes learned are the truing of surfaces with planes and correct methods of testing. They are also taught how to measure accurately, draw lines correctly, and cut to lines with the saws if needed and also to saw for making a fine planed joint as good as any mechanic would make.

He learns to saw to a line.

The uses of nails and screws are very thoroly taught in making projects in which the uses of these fastening materials are of such a nature as to require the use of proper methods. They are taught how to select and order screws and nails and other materials for use in repairs and new work so as to secure satisfactory results at a minimum of expense.

Using Bits

Bits of various kinds and sizes are used. Some projects are planned to require very careful methods in boring. These lessons teach the principles so thoroly that the pupil is enabled to use bits for any purpose likely to be required about the home. No parent need hesitate about permitting his boy to use bits and brace after having completed the lessons in boring as given in the Mechanical Science studies.

Using Saws

The uses of the hand saw and rip saw are taught very carefully so that common sawing and joining of pieces can be accomplished rapidly and well.

Finishing Furniture

Smoothing of surfaces and use of finishing materials is given considerable time. The standard for this work is that it must be equal to or better than the usual standard of commercial furniture. No parent need hesitate to have the home furniture refinished by boy or girl who has completed the Mechanical Science course thru cabinetwork. The completion of the textbook, WOODWORK FOR THE GRADES, supplies all instruction necessary for doing the usual home repair jobs and refinishing of common furniture.

Upholstering

Only the more simple problems in upholstering are attempted in the first year of work, but in the more advanced lessons the use of fine upholstering materials is taught with the result that the work done by the pupils is usually equal to that of first class workmen as usually done by them in standard commercial shops. The chief value of this instruction in upholstering is in repairing or reupholstering the home furniture.

He learns to use bit and brace.

The making of complete sets of upholstered furniture is well within the ability of the more mechanically inclined pupils who have completed the entire course as it can be given in one-room rural schools.

Making the Most Out of the Time

In schools these lessons are confined mostly to the more simple projects in furniture. This is not because this furniture is more useful than the larger pieces, but rather because much more instruction can be given in the time that is properly allotted to this subject. It gives a much larger return to the boy for the time spent and also is much more ec-

onomical in teacher's time and other expenses. In fact the making of these smaller projects adds very little to the expenses that are met by the local taxes of the community. Of course, each pupil pays for the materials used in his own project. With these smaller projects it is possible, even in the one-room rural school, to teach so many principles of mechanical work and make the instruction so thoro that pupils are able to do almost any task with mechanic's tools that the home may require. These include all sorts of repair jobs, making whiffletrees, wagon bolsters, racks, boxes, feeding trofs, coops, bins, seed testing trays, etc. They also learn to cut rafters and other parts of buildings, hang doors, and make window frames, in fact the boy who does the work of the Mechanical Science course as thoroly as a boy ought to, can do just about anything in ordinary farmer's mechanical work. A young lady after completing the special course at the normal school superintended the building of a large house. Her course included no more instruction than is entirely within the limits of the one-room rural school, altho to secure a teacher qualified to give as extensive a course would require care in selection.

You Can Have These Improvements In Your School

And all that is necessary in order to have this work in your own school is to secure a teacher of Mechanical Science and provide the neces-

sary tho limited amount of equipment. This has been accomplished in other schools. It can be accomplished in your school, and the entire expense of the work may be met without taking any part from the regular school funds if it is necessary to do so.

Metal Work

Yet even more may be taught if the work is continued year after year. It is very poor policy to permit skipping about in the work. The pupil can be taught to work systematically and correctly only by going over the course systematically and thoroly. This sometimes seems to delay some needed lesson yet it is certainly the best method to follow.

If the work can be continued for three years or more so that boys in the eighth or ninth grades or those from fourteen to sixteen years of age will have had at least two years of work in wood they can then take up the study of metal work. This would include the use of files, laying out metal work, hand drilling, cutting threads, use of hack saw, fitting bearings, etc. A very useful course along these lines can be given without machinery and with but few and not very expensive hand tools. The teacher would need to have special training for this work. This could be had during a summer term at some school where Mechanical Science is taught. Such courses in metal work as are given in engineering schols are not a suitable preparation for this work.

Mechanical Drawing

Mechanical drawing is not essentially a part of the Mechanical Science instruction, yet incidentally a considerable amount of information in regard to reading and making drawings results from the constant use of drawings in the Mechanical Science lessons. Whenever desired, regular instruction in mechanical drawing can be given. Such instruction when using simple equipment in the grades should result in the pupils being able to read plans of buildings and drawings of machinery. It also ought to result in sufficient proficiency to enable the pupil to make simple drawings of buildings and machinery repairs. A bright boy or girl ought to learn enuf drawing in the rural school to be able to continue the study in private to as great an extent as is desired. The value of such instruction is likely to be very great. It should open up the entire range of industrial and technical literature.

Our Guarantee

The publishers of the Mechanical Science series are willing to guarantee the results as outlined above if the Mechanical Science textbooks are used, reasonable facilities supplied and a competent teacher employed. They make no charge for securing competent teachers and will guarantee results with teachers they recommend. The fact must, however, be kept

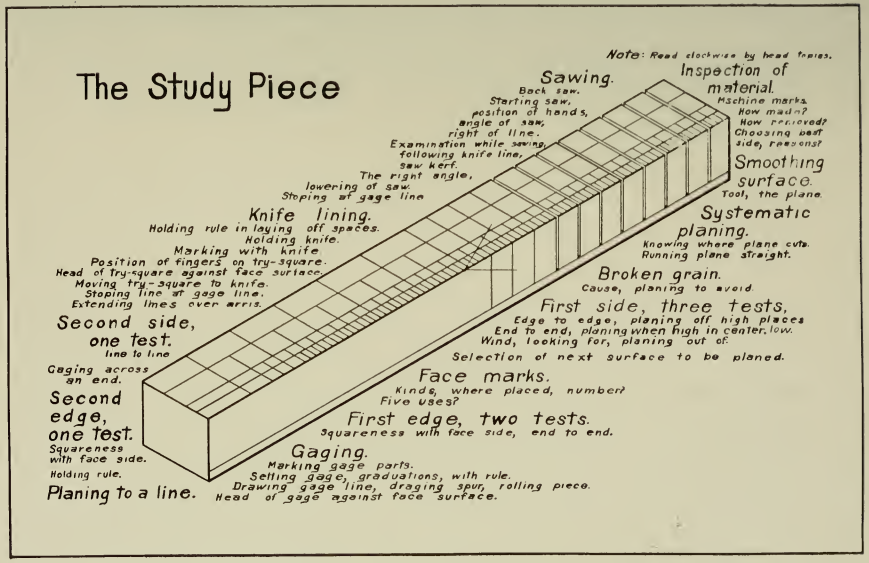
clearly in mind that manual training as it is usually taught is in no respect the same as Mechanical Science. Manual training does not use the same lessons, does not use the same selection of tools or meterials and teaches very little of the same tool processes and practically none of the fundamental principles that are given special emphesis in the Mechanical Science work, yet the casual observer is likely to think the equipment the same and the lessons similar. So great is the advance in the Mechanical Science work, because it is truly scientific, that a training in the usual manual training work is a hindrance rather than a help in learning the Mechanical Science work. It may be likened to attempting to teach one to play the piano correctly after they have become fairly poficient in playing by ear without having learned the scale. Sometimes such persons

He learns to do finishing.

learn correct methods very rapidly, but such is not usually the case, and the old habits of unscientific methods are likely to return.

The Name

It should be understood that the name which is given to the shopwork of any particular school cannot be taken as evidence as to whether the Mechanical Science work is taught or not. State laws using the name manual training and catalogs and circulars issued before changing to Mechanical Science work, often necessitates the use of a different name. Habits of the community tending to use the name manual training for all sorts of school shopwork and many other causes enforce the use of the wrong term long after the work has been changed to Mechanical Science. There are a few cases that have come to the notice of the publishers in which the name Mechanical Science has been used while making no effort to teach the Mechanical Science work. Every one interested in the improvement of our public schools ought to make a persistant effort to use the correct names for the various kinds of school shopwork. Only by such care in placing a distinction upon each type of work can the advantages or disadvantages of each system come into prominence and the inferior be displaced by the superior. In looking up schools and in securing teachers the safe way is to write to the Maudslay Press for complete information.


Note: Read clockwise by head topics.
The Study Piece
Sawing.
Back saw.
Starting saw,
position of hands,
angle of saw,
right of line.
Examination while sawing,
following knife line,
saw kerf.
The right angle,
lowering of saw
Stoping at gage line
Inspection of material.
Machine marks.
How made?
How removed?
Choosing best side, reasons?
Smoothing surface.
Tool, the plane.
Knife lining.
Holding rule in laying off spaces.
Holding knife.
Marking with knife
Position of fingers on try-square.
Head of Try-square against face surface.
Moving try-square to knife.
Stoping line at gage line.
Extending lines over arris.
Systematic planing.
Knowing where plane cuts.
Running plane straight.
Broken grain.
Cause, planing to avoid.
First side, three tests.
Edge to edge, planing off high places
End to end, planing when high in center, low.
Wind, looking for, planing out of.
Selection of next surface to be planed.
Second side, one test.
line to line
Caging across an end.
Face marks.
Kinds, where placed, number?
Five uses?
Second edge, one test.
Squareness with face side.
Holding rule.
First edge, two tests.
Squareness with face side, end to end.
Gaging.
Marking gage parts.
Setting gage, graduations, with rule.
Drawing gage line, draging spur, rolling piece.
Head of gage against face surface.
Planing to a line.

The Mechanical Science Study Piece

Evey person interested in educational work ought to make a careful study of the pedagogy involved in this series of lessons. The study should be undertaken with a full realization of the following facts which have been demonstrated so many times and in so many different schools and under such a variety of conditions as to warrant their acceptance by the most conservative.

The Mechanical Science work creates an interest beyound that of any other system of school shopwork, and results in a larger percentage of pupils electing the shopwork.

It gains a more earnest and efficient cooperation from parents, and the approval of tradesmen.

It is less expensive as a whole altho teachers properly prepared to teach Mechanical Science command higher salaries.

It is a greater aid to other subjects than even those systems using "manual training" as a method.

It develops larger initiative and more freedom of expression on the part of the pupil.

It is a better preparation for industry than the usual work of special public trade schools or the "Smith Hughes Schools".

It meets all requirements in shop experience for modern industrial education.

It ought to be taught and can be taught with thoro success in every public school in North Dakota including every one room rural school.

EQUIPPING RURAL SCHOOLS FOR MECHANICAL SCIENCE

No doubt the matter of equipment keeps many schools from beginning the Mechanical Science work. This ought not to be the case because a little advice from the county superintendent as to how to go about securing funds is likely to result in obtaining the equipment without burdening any patron or tax payer.

Various methods have been used with success in securing all needed equipment. There is no sufficient reason why the money should not come from regular taxes. To use taxes for the teaching of a subject that brings such valuable and immediate results as the Mechanical Science work is certain to give is likely to lessen rather than increase the usual objections to school taxes However there are many ways of securing equipment without using money raised by taxation. Probably the most usual plan is by means of entertainments and community socials.

When we consider the large number of equipments for city schools that are the personal donations of single individuals, we ought not to consider

it improbable that some one or two patrons of the school provide the equipment.

In one community the boys arranged with farmers living near the school to plow the school field and do the necessary team work in raising a crop of potatoes. The boys did the hand work. The yield of potatoes was more than sufficient to supply the needed equipment for the Mechanical Science work.

Yet another method is for individual pupils to contribute money earned by home tasks. When we consider how little is required to initiate the work and how valuable the results, it is surprising that not every school is planning to establish the work. There are many possible ways of meeting the expense and the resourceful people in consultation with the enthusiastic county superintendent will not fail to find a way.

The following suggestions as to equipment and supplies will be helpful in making plans.

From "Elementary Turning"

HELPFUL LISTS

The following lists of tools and materials cover the usual requirements for rural rchools. There need be no delay in placing the order. Every teacher of Mechanical Scienee would select nearly the same equipment. It is, therefore, not necessary to delay ordering equipment until a selection is made by the teacher.

Wrtie for Prices

No prices of tools or equipment are given in this leaflet, as these vary from time to time. The exact price at which every item of the equipment and all supplies may be secured, including delivery to any freight office, may be had by addressing the Service Bureau of the Maudslay Press, Valley City, N. Dak. Inquiries should include either a complete itemized list of all tools and supplies desired, or definite information in regard to number of pupils in each grade, size of room, and whether full equipment is desired or only the minimum amount necessary to carry on the work. Requests for prices on lumber should always state whether only native woobs are desired or the usual variety of native and foreign woods.

Determined by Number of Pupils

The bench and tool equipment of rural schools will differ for the usual rural school only to correspond with the number of pupils who are to engage in the work. The lessons to be taught will be substantially the same for all schools and pupils, grade for grade. The tools and supplies will, therefore, be the same in character for all rural schools.

Use Minimum Equipment

The total expense of tools and materials for wood benchwork may vary within wide limits. Certain tools are essential; others are desirable yet not essential. Sometimes we see equipments with such a variety of tools as to be harmful rather than helpful in the work that is to be done the first year. It is always better to start with a minimum of equipment and add to it as the pupils advance and the work is developed.

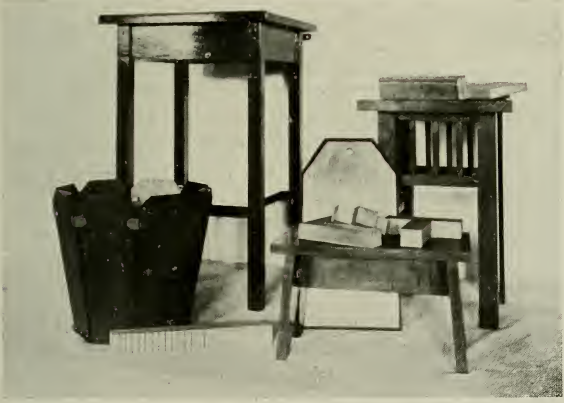
Special Prices

The standard tools used in Mechanical Science work can always be purchased by schools at special prices, whether in large or small quantities. The important matter in initiating the work is to see that the bench is satisfactory and that every tool necessary for the first lessons is on hand at the opening

of school. Materials for the first lessons ought also to be ready on the opening day of the term so that both teacher and pupils will give proper consideration to the shopwork as the classes are organized and program arranged.

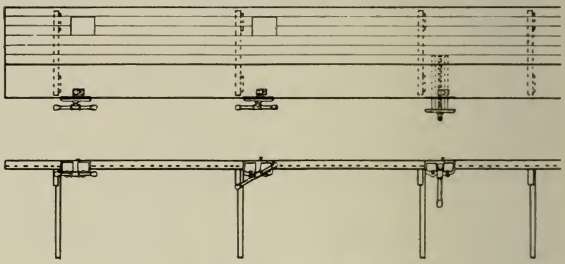
Small Village Schools

In this leaflet we deal with conditions that prevail in a considerable number of rural schools. This information will also be of value to those wishing to establish the work in small villages in which one of the regular teachers will devote part time to benchwork, giving it in the same manner as in the one-room rural school.



Equipment For Twenty Pupils

As a basis on which to determine the quantities of tools and supplies, we will assume that the school has the usual number in each of the eight grades and a total of twenty pupils in the school.



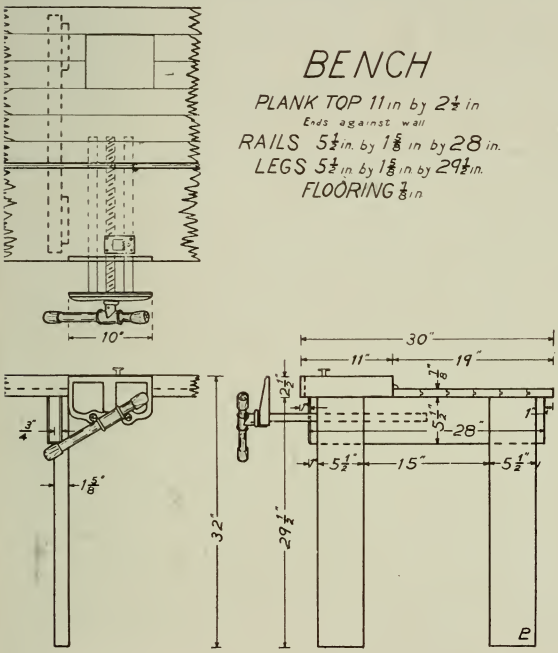
Front View of Home Made Bench

Benches

To accomodate these the bench or benches ought to provide room for two vises and one space without a vise, at which one or two pupils may work at finishing. A length of twelve to eighteen feet will be required. Sixteen feet would be satisfactory, but twelve feet would cause crowding and inconvenience.

The only fittings for the benches that cannot be obtained locally are the vises and stops. Large screws to secure the plank to the frame may not be readily procured in some localities. These may be had of The Maudslay Press. A dozen will be sufficient for the usual bench.

This bench would be divided into three spaces of six, five, and five feet. The bench shown in this picture has the third vise. One vise should be placed one foot from the left hand end and the other vise



six feet from the same end. The third division may also have a vise, but in small schools this part of the bench may be used for finishing and similar work.

Carpenter Can Make Them

These benches may be made by any good carpenter who will make out a bill of materials from this drawing, and procure the materials from your local lumberman.

For the top plank the best avaliable material in many localities is 3 inch spruce or fir. Such material has been used with good results in many benches. For the framework any good dimension lumber may be used.

In some schools it will be found a matter of economy as well as more convenient to have cabinet benches as shown in the picture. This bench contains drawers sufficient for all usual needs for storage of both stock and pupil's work. This lessens the work of keeping the material and tools in order.

Cabinet Bench for Rural, Graded, and High Schools.

TOOLS AND MATERIALS

For schools beginning shopwork we advise ordering at first only such materials and tools as are certain to be used the first few months of the work. After the work is well under way and the number of pupils who will take the work has been determined, an order should be placed for tools and materials with which to complete the year's work.

Tools

This list includes all the tools required for the lessons in "Woodwork for the Grades." These will usually be sufficient for the first year. A few additional tools will be required for work in joinery and cabinetwork:

List of Tools:

Automatic Drill. 1 Yankee No. 44
Bench Knives. 2 M S, No. 1
Bits. 1 set of 13. Russell Jennings
Bits. Set of 9 Twist Bits. 2/32 to 12/32
Bit Brace. 1 Ratchet. Barber, Nickle, 8-in
Bench Stop. 2 Morrill No. 1
Brushes. 1 Special Shellac, No. 1, 1-in
C Clamps. 2 Malleable, 4-in.
Clamps. 2 Sheldon Steel Bar, 3-ft
Countersink. 1 Rose. Buck Bros.
Countersink. 1 Double Lipped. Starrett
Dividers, Wing. 1 Beemis and Call, No. 6, 6-in
Drills. 1 set for Yankee Drill No. 44
File. 1 Flat Mill File, 8-in
Guages. 2 Stanley, No. 62
Hammer. 1 Van Doren, No. 2, 13oz
Hand Screws. 2 Bliss No. 812, 10-in.

Nail Sets. 2 Pratt, $\frac{1}{16}$-in. $\frac{1}{32}$-in
Oil Can. 1 Coppered Steel, 3$\frac{1}{2}$ in
Oilstone. 1 India Combination. No. 2
Plane. 2 Bailey, No. 3, smooth
Plane. 2 Bailey, No. 5, Jack
Pocket Rule. 2 Stanley, No. 84
Saw. 2 Back Saws. Diston, No. 4, 10-in
Saw. 1 Hand Saw. Diston, No. 18, 20-in
Saw. 1 Rip Saw. Diston, No. 18, 20-in
Scraper. 2 Cabinet. 2$\frac{1}{2}$x3-in
Scraper Plane. 1 Stanley No. 85
Screw Driver. 3 Hurwood. 4, 6, 8-in
Screwdriver Bit. 1 Buck Bros.
Steel Square. 1 Sargent, No. 100
Trysquare. 2 Stanley, No. 12, 6-in
Trysquare. 1 Stanley, No. 12 12-in
Vise. 2 Abernathy, No. 80, 10-in

These are better than those listed above.

Bit Brace. 1 Sampson Ratchet No. 8008, 5-in.
Pocket Rule. 1 Stanley No. 62

Supplementary List

Bar Clamps. 2 Black Brothers, 2-in by 3-ft

The following are desirable but not essential.

Chisels. 3 Buck Bros. No. 2 $\frac{1}{4}$, $\frac{3}{8}$, $\frac{7}{8}$ in
C Clamps. 2 Malleable, 6-in.
Clamps. Sheldon Steel Bar, 4-ft.
Dividers, Wing. 1 Beemis and Call, No. 6, 8-in
Hand Screws. 2 Bliss No. 911, 12-in.
Plane. 1 Baley, No. 8, Jointer
Steel Letters and Figure. 1 Set, $\frac{1}{4}$-in
Saw. 1 Hand Saw. Atkins Perfect Manual. 26 in.
Saw. 1 Rip Saw. Atkins Perfection Manual. 28 in.
Tee Bevel. 1 Stanley, No. 18, 8-in

Lumber

Be refering to the book, SUGGESTIVE COURSES, the projects that will be used by each pupil in each grade can be determined. At first it is best to order material for only the first problems. The following would usually be a desirable selection.

For each pupil in either the fifth or sixth grades order one study piece, one cutting board, one game board, and one No. 148A bookrack. For each pupil in either seventh or eighth grade order one study piece, one benchhook, one breadboard, and one taboret. The taborets should vary in styles and sizes according to the sizes and ability of the pupils. By refering to Nos. 180 to 195 in WOODWORK FOR THE GRADES a selection may be made.

For the first work of the first year of pupils in the high school grades the materials would be the same as for the larger pupils of the eighth grade.

Nails

A variety of nails will be used. These may be purchased locally as required. As 6d box nails are used for the benchhooks, one or two pounds of these may be included in the first order.

Screws.

Screws should be purchased in gross packages. But few sizes are required for the first work. One

gross of each of the following sizes will be sufficient. In flat head bright screws No. 8 X 1½ inches, No. 10 X 1¼ inches, No. 10 X 1½ inches, and for the bench top 1 dozen No. 20 X 4 inches. In round head blued screws No. 7 X 1¼ inches, No. 8 X 1¼ inches, No. 10 X 1¼ inches, No. 10 X 1½ inches, No. 10 X 2½ inches, and No. 12 X 3 inches.

By the time screws are required for other problems the teacher will be able to make proper selections.

Sandpaper

Three grades of sandpaper are sufficient for the first work. These are Nos. 0, ½, 1. Later No. 00 and No. 1½ should be added. One quire of each will be sufficient for the first order.

Finishing Materials

But a few finishing materials are required for the first lessons. Two pounds of white gum shellac and one gallon of best denatured alcohol will be sufficient for a small school for the first year. The alcohol should be procured locally.

The brushes for the shellac should be the best cement set and one inch wide. One brush is enuf for a small school.

After the work is well under way, some stains and other finishing materials may be purchased.

The following may be in the first order.

Burnt Seinna. 1 lb. Ground in Oil_____
Burnt Umber. 1 lb. Ground in Oil.....
Rose Lake. 1 lb. Ground in Oil_____
Wood Filler. 1 lb. Wheeler's Paste Filler_____
Glue. ½ Gal. Le Page Liq. Glue, Russia Cement Co.
Brush. 1 Special Cement Set.....

Pumicestone

Two or three grades of pumicestone may be used. The grades are F FF FFF. The finest is FFF. Two pounds of each will be likely to last the entire year. As a liquid to use with the pumicestone, rubbing oil is best. As this kind of oil can seldom be procured in small towns and as the expense of shipping such liquids is small quantities is considerable, it is usually better, at first, to use water for rubbing down the finish.

Oil

For the oilstone procure locally a good grade of light machine oil.

This music cabinet may be made in a rural school.

The design may be changed to that of a phonograph cabinet or similar article.

BOOKS

There should be one copy of WOODWORK FOR THE GRADES for each pupil taking the work, so that the books may be taken home for home study and for reference as the pupils attempt similar work at home.

The teaching of Mechanical Science in school is certain to lead to successful homework and the interest of parents in this new school subject. To encourage the use of these books at home is to begin the formation of habits of home study that are very desirable and that will continue after leaving school.

There should be at least one copy of WOOD FINISHING for reference. No doubt several pupils will wish to own their own copies.

Mechanical Drawing

As mechanical drawing can be done on the usual school desks there is no sufficient reason why any boy or girl should not study this very useful subject if they wish and will procure necessary equipment.

We suggest that you write us stating how many pupils and of what grades wish to take up the study of mechanical drawing, and we will gladly furnish list of suitable equipment and all necessary materials with prices.

SECURING A TEACHER OF MECHANICAL SCIENCE

Securing teachers for the Mechanical Science work need not be a difficult task if taken up in the right manner. The best results are secured by teachers of experience in other subjects who are progressive in their work and have sufficient ambition to make a definite study of the system.

Make a Contract

This being the case, the better method is to select a thoroly reliable teacher and make a definite contract with her, paying such additional salary as seems just, on condition that she spend a definite, specified time in preparing for teaching this work. Contracts ought definitely to specify that the teachers attend classes recommended by the author of the Mechanical Science textbooks as otherwise they might find it more convenient to take up the usual manual training work and would then be entirely unable to fulfil their contracts as teachers of Mechanical Science work.

Worthless Imitations

As with everything new and really worthwhile there are certain to be worthless imitations of the Mechanical Science work. These impositions need injure no one nor lead into any difficulties whatever as the publishers of the textbooks are always willing to give definite and reliable information in regard to where satisfactory instruction in the Meanical Science work can be obtained. If there is any doubt in regard to the character of instruction offered by any institution, its standing should be definitely determined by securing information from the publishers.

Amount of Time

The amount of time that a teacher ought to be required to spend in preparation for teaching Mechanical Science in a rural school must necessarily vary with circumstances. Miss C , whose success has been mentioned, received instruction for a part of each day during a summer term of six weeks with the addition of some private lessons, making a total of nearly as much work as could be given in six weeks when devoting full days to the Mechanical Science work.

In a High School

A high school in North Dakota has found very satisfactory the work of a young lady who spent all her time for six weeks in shopwork and drawing under the instruction of the author of these texts. This is an extremely meager preparation and ought not to be considered sufficient in any case, but is unquestionably better than to have a teacher of manual training with any amount of preparation. The important consideration is that this work being a science rather than a craft or art can be studied in private to a very great extent after one has acquired the first principles. For this reason these people who have nominally such meager preparation may, in reality, have a better and more useful preparation than one who has completed a two year course in manual training. Results of work accomplished leave no doubt about this being the case.

Something to Teach

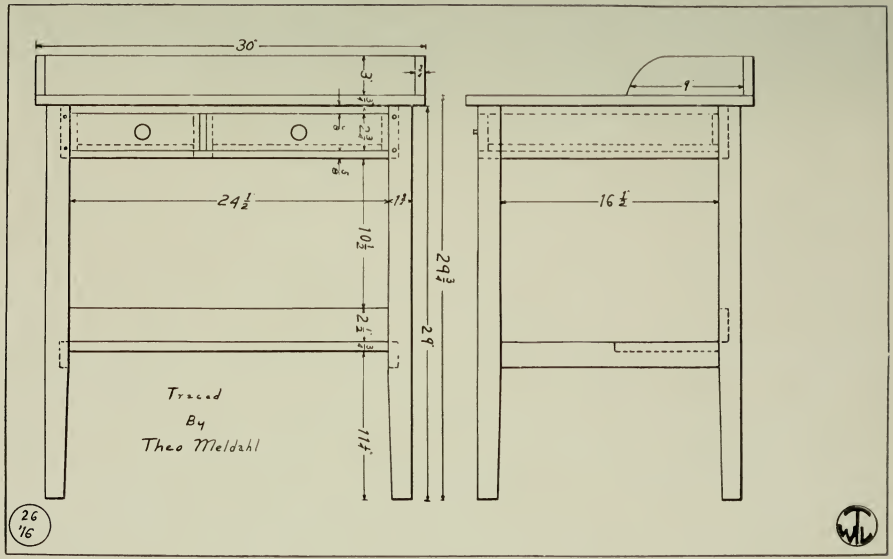
The reason why the exhibit made by Miss C from the rural school won over that made by the city school was that Miss C actually had a more definite body of subject matter to teach; her pupils actually learned more and their work showed that they had learned more; because of this the rural school won the first prize over the city school. The

fact that the instructor in the city school had what was considered exceptional training, having studied manual training at two of the most widely known special schools for training manual training teachers and was highly recommended by both of them, illustrates the fact that no amount of wrong training is equal to even a little of the right kind.

Another Plan

The next best plan for securing a teacher is to correspond with the Service Department of the Maudslay Press. Write to the publishers, telling them exactly the conditions under which the work is to be given and stating the salary that is to be paid. They will then do their best to secure a suitable teacher. This, however, often results in disappointment, as the supply of Mechanical Science teachers is never enuf to meet the demand.

Made by an eighth grade boy.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By
Theo Meldahl
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16

PUBLICATIONS

OF THE

MAUDSLAY PRESS

THE MECHANICAL SCIENCE SERIES

The Maudslay Press

VALLEY CITY, NORTH DAKOTA

TERMS

The prices given in this catalog are the retail list prices. Dealers and schools should write for discounts. All accounts are net and due at thirty days from date of invoice. We cannot give unlimited time on accounts and, therefore, make all bills subject to sight draft at thirty days.

No Free Copies

One of the first questions that must be considered by publishers of text books is that of free copies. The books of this series are absolutely new and of value as library copies to every one at all interested in school shop work. It seems proper to treat all first copies as copies for library use.

The publishers have therefore decided to mail no free copies. First copies of all books are forwarded prepaid to teachers and school officers at fifteen per cent discount. Books ordered for examination may be returned within thirty days and the remittances, if any, will be refunded.

We very much prefer to have cash accompany order when the amount is small; as the expense of opening an account and forwarding invoice, statements, and receipt is entirely out of proportion to the amount of the invoice.

The Maudslay Press

THE MECHANICAL SCIENCE SERIES

The following publications issued by The Maudslay Press, or as in the case of "Elementary Woodwork," "Elementary Turning" and "Elementary Cabinetwork," by special arrangements with the publishers, constitute the Mechanical Science Series. All of the publications of this series are the work of one author, Mr. Frank Henry Selden. The material for this series has been gathered by Mr. Selden during more than thirty years of continuous effort to produce that which would be thoroly practical both as a part of a liberal education and as a suitable foundation for successful entrance upon industrial occupations.

A Long Experience

In order to make certain that each step in the development of this course would be correct in theory and in practice the author has spent about

as much time in industrial pursuits as in teaching after having completed a professional course in preparation for teaching and demonstrating his ability to teach the old line subjects by successfully holding positions as teacher and principal. He has also held positions in his chosen line of work in various capacities in night schools, high schools, and higher institutions.

Well Founded Theories

It will readily be conceded that such a broad and thoro preparation, probably exceeding by far that of any other person who has attempted work in this line, would lead to ideals and theories differing to some extent from those usually held by the superficial students of this new line of school work. This is no doubt the case, and, therefore, in examining this series of texts or in experimenting with their use in schools great care should be exercised to eliminate all theories and methods that do not properly belong to the Mechanical Science work.

Superior Results

In making any study of this system, one should enter upon the work with a full realization of the fact that in the hands of teachers who understand the proper methods of teaching this work this sys-

tem always yields results far beyond those which have ever been thot possible of attainment by other systems. The remarkable success of any one school cannot be attributed to the personality of the teacher or the exceptional ability of the pupils or the superior equipment, for schools with inferior equipment have shown superior results when compared with those with the best equipment, pupils of all grades and in a great variety of communities

The texts contain many excellent illustrations.

have shown the same peculiar characteristics of superior results and teachers who have never before been considered as especially strong in personality have, with meager equipments, produced results

that have won for them great commendation and in all cases where their work has been exhibited in contest with that of other systems have won first prize and in cases in which no prize has been offered the Mechanical Science work has been generally recognized as superior.

Prize winning Series

As an instance of success of this character, a rural school with but one teacher who taught the Mechanical Science work all day long in the one room of her building, while also attending to other recitations, exhibited the work in competition with the work of the grades of a city with the result that the rural school took the first and substantially all the other prizes. That this was no mere chance would be evident to any one who might examine the work. There is no doubt but that the prizes would have been awarded in the same manner by any judge whether a person unacquainted with such work or one especially expert in this subject so far superior was the rural Mechanical Science work. But this is not all—the city schools have a teacher supposed to be exceptionally well qualified in the old system of shopwork and who has been retained for several years. His work was unquestionably superior to most of the work of schools having the usual manual training course.

Will Guarantee Results

The publishers of these texts will guarantee these high grade results in any school, in which these texts are used as intended. This is not the same as guaranteeing superior results from the use of a new text in any other subject, because the shopwork is passing thru the change from unscientific to scientific subject matter, and the Mechanical Science texts are the only available texts presenting this scientific subject matter.

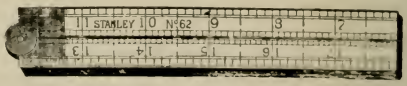
One of the many grade schools in which Mechanical Science is taught.

Imitators Fail

Thruout, the series differs fundamentally from any other texts for school shopwork now in use and altho many have seen fit to copy, imitate or superficially rewrite much of the contents of these texts, because of recognizing their superiority, no one has yet been able to appropriate the fundamental ideals that give them their exceptional value.

Use Texts as Intended

To give these texts a fair test they should be used according to the methods of instruction intended and by a teacher who has made a thoro study of this system. A school should be set apart for this purpose and the publishers will gladly undertake to secure a competent instructor. If this thoro test cannot be made, much good is often accomplished by procuring the texts and following them to as great an extent as circumstances will permit.



Woodwork for the Grades

This is the text to be used in beginning shop-work in Mechanical Science in whatever grade the work is begun in both grades and high school.

This text contains a large variety of material so arranged as to afford opportunity for selecting exactly the right project for each pupil. There is no question but that in actual practice the use of this text leads to a more perfect adapting of work to individual pupil's needs than is possible with any other text or system of instruction It is a thoroly practical text and pupils who complete the work as given show exceptional interest and ability in doing work at home. No other text will compare with this one in giving power to do work with tools outside of school as records of pupils show, proving this to be a text of exceptional value in developing initiative and industrial efficiency.

The Mechanical Drawings are arranged and graded with great care so that the average boy will, in using the book, learn, without any special effort, to read drawings. The text contains many complete working drawings of projects from simple one-piece projects to chairs and tables.

This is the text that has the enviable record of always having its pupils win first prize whenever their work is placed in competition with work of other systems and they have been in charge of a competent instructor.

Wood Finishing

This text is a supplement to WOODWORK FOR THE GRADES and should be used as a text by each pupil. It takes up in the order in which they occur in the course the various problems in finishing.

It first tells how to finish such woods as pine and basswood. and then the more difficult woods such as spruce and fir, and lastly, such fine cabinet woods as oak and mahogany.

It gives various methods of finishing such as shellac polishing, staining, oiling, and varnishing. Grinding finish with pumicestone and rottenstone is treated in a manner that the beginner can understand.

It is a beginner's book and, therefore, tells exactly how to proceed with the first processes. These directions are not merely information in regard to processes but explanations as to how and why and are so complete that a pupil should be able, after doing the work as given in this text, to do a great variety of finishing on many classes of furniture.

HOW TO TEACH WOOD FINISHING is a similar text with some suggestions as to methods of teaching. On completion of the special text on MECHANICAL SCIENCE METHODS this text will be discontinued.

Mechanical Science Methods

This is a text for use in Normal Schools and a most helpful handbook for teachers using the Mechanical Science texts.

It gives in great detail the exact methods to be used in presenting the Mechanical Science work basing the directions on the first lessons. It is well understood by teachers of Mechanical Science that the first lessons are extremely important and that if they are properly taught, there will be little trouble about the others.

This text is based upon the experiences of many teachers and is a thoroly practical and reliable guide. It is not only valuable for the teacher, but is also a most helpful book for the principal and superintendent as it supplies exact information as to how the work should be taught. The superintendent who requires of his teacher the standard and results called for by this text will find his patrons highy pleased with the interest and values resulting from his school shop.

Suggestive Courses in Mechanical Science

This is a handbook for teachers. The Mechanical Science texts contain a large variety of problems sufficient for pupils of all grades. Very seldom will it be necessary for any pupil to make all of the projects given. SUGGESTIVE COURSES is to aid in selecting those that will form a logical and connected course of study.

Part One covers in a very complete manner the entire course as it is usually given when the work is begun in the fifth grade. Part Two gives a similar discussion of the work when begun in the sixth grade. Part Three outlines the work for beginning in the seventh grade.

When pupils begin work in the first year of high school there are special difficulties to be overcome. These are discussed and problems suggested for such pupils in Part Four,

Part Five discusses some general features of the Mechanical Science work of interest to both teachers and administrators. This discussion is followed by some statements in regard to the results that have already been gained by the introduction of this system of shopwork.

Elementary Woodwork

Great care has been taken in the preparation of this text to present the work so that the beginner will be able to understand each problem and execute the piece in a thoroly workman-like manner at the first attempt. It is a fact of great significance that students who use this text in its regular order and under the directions of a competent instructor very seldom find it necessary to rapeat the making of any joint. There is a standing challenge to all other systems of school shopwork or schools using any other text to exhibit all work done including all spoiled or unaccepted pieces.

It is not only interesting but a fact of great importance to school officers that work done by the use of this text under the direction of a competent instructor has invariably been pronounced superior when exhibited in competion with work done by the use of any other text.

This superior excellence is attained not by repetetions and prodding by the teacher but by learning correct methods of work and the principles on which the methods are based. The student thus becomes a highly intelligent scientific mechanic instead of an imitative craftsman. This not only leads to great enjoyment in the work but also lead to self criticism and initiative.

Elementary Drawing

This text is for use by those who have had no previous instruction in drawing. It covers the first essential elementary problems in great detail. The instruction given is so very complete that this book may be used successfully as a home study text or in schools not provided with a special teacher of drawing.

All of the problems correlate very closely with those of the shop texts of the Mechanical Science series. This is of great assistance in both shopwork and drawing. The text on drawing may be referred to for aid in understanding the shop drawings and the drawings in the shop texts may be referred to as examples and additional illustrations of the problems in drawing. The text on drawing contains several modifications of the problems given in the shop texts. These will be found very helpful.

This text should be used in whatever grade the study of mechanical drawing is begun. If conditions permit, the work should begin in the seventh grade, using only a very limited equipment. By the time the pupil has completed the eighth grade he should be able to read any drawing that would be given to a boy in regular employment, and should be able to make free hand sketches and simple mechanical drawings.

Elementary Cabinetwork
for
Home and School

This text, the fourth of The Mechanical Science Series, covers the first studies in cabinetwork. A large number of problems are given in a very complete manner. Many of the objects are shown in picture and in orthographic projection with details.

There are many suggestions as to modifications and original designs with such complete information in the text on all details of construction as is needed to lead the pupil to individual effort.

The text thruout emphasizes the doing of every part of the work accurately the first time, thus leading to exceptional speed and that deep interest that comes from a realization of success and mastery.

This text is especially useful for the home mechanic as it gives in complete detail just the information that is likely to be needed, and has a complete index that makes easy the finding of any information desired.

This information in regard to laying out work, clamping parts together, finishing, making tops, making drawers, paneling etc., is in addition to the directions for making the various projects and the complete working drawings and pictorial illustrations.

Elementary Turning

The exceptional success of the students who use this text is its best recommendation. The subject of wood turning is presented as a science and the problems given lead the student to a definite understanding of the principles involved.

The elementary studies are followed by a variety of problems illustrating various combinations of the elements. This leads to a broad knowledge of the work and ability to work out new problems.

The mirror base and frame shown above were designed and made by a lady student and illustrate what may be accomplished by any student by a reasonable effort. The finish on this mirror frame was fully as excellent as the best commercial work and a positive demonstration of the claim that the Mechanical Science texts teach students to aim for and attain a very high standard of workmanship.

MECHANICAL SCIENCE IN EDUCATION

The Mechanical Science work cannot be ignored. It has had a steady and very encouraging growth for a considerable time, and there can be no question but what it will become a very important factor in school work. Those who have not informed themselves in regard to this work or who have only a theoretical knowledge of it should not overlook the fact that its best friends are those who have the most complete information concerning it, and those who have been able to give it a thoro test in their schools are its confirmed friends and supporters. It has never been taken up by any school official and given a fair trial and then abandoned. It has met with success practically everywhere it has been undertaken. This book on the theory of Mechanical Science should therefore be carefully studied by every one wishing to be well informed in regard to the new in education.

If the theory set forth in this book is correct, or reasonably near the right interpretation of modern industrial life, there can be no prospect of successful progress in practical or industrial education without a recognition of this science as a factor of a liberal education.

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